IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-12. (Canceled)

13. (Currently Amended) A spin valve sensor comprising:

a first pinned layer having a first width and a first magnetic orientation;

a free layer, disposed above the first pinned layer and separated from the ~~first~~ first pinned layer by a spacer, the free layer having a second width disposed above the first pinned layer;

a ferromagnetic bias layer having the second width disposed above the free layer and a second magnetic orientation orthogonal to the first magnetic orientation; and

an antiferromagnetic bias layer having the second width disposed above the ferromagnetic bias layer, the ferromagnetic bias layer being exchange coupled to the antiferromagnetic layer;

wherein the second width is smaller than the first width.

14. (Previously Presented) The spin valve sensor according to Claim 13, further comprising:

a second pinned layer having a third magnetic orientation anti-parallel to the first magnetic orientation; and

a coupling layer disposed between the first and second pinned layers.

15. (Previously Presented) The spin valve sensor according to Claim 14, wherein a thickness of the first pinned layer is substantially equal to a thickness of the second pinned layer.

16. (Previously Presented) The spin valve sensor according to Claim 15, further comprising an anti-ferromagnetic (AFM) layer disposed adjacent to the first pinned layer.

17. (Previously Presented) The spin valve sensor according to Claim 16, wherein a thickness of the AFM layer establishes exchange coupling between the AFM layer and the first pinned layer.

18. (Previously Presented) The spin valve sensor according to Claim 16, wherein the first and second pinned layers are self-pinned.

19. (Currently Amended) A magnetic storage system, comprising:

a magnetic recording medium;

a spin valve sensor disposed proximate to the recording medium, the spin valve sensor, including:

a first pinned layer having a first width and a first magnetic orientation;

a free layer, disposed above the first pinned layer and separated from the ~~firsst~~ first pinned layer by a spacer, the free layer having a second width disposed above the first pinned layer;

a ferromagnetic biasing layer having the second width disposed above the free layer and a second magnetic orientation orthogonal to the first magnetic orientation; and

an antiferromagnetic bias layer having the second width disposed above the ferromagnetic bias layer, the ferromagnetic bias layer being exchange coupled to the antiferromagnetic layer;

wherein the second width is smaller than the first width.

20. (Previously Presented) The magnetic storage system according to Claim 19, further comprising:

a second pinned layer having a third magnetic orientation anti-parallel to the first magnetic orientation; and

a coupling layer disposed between the first and second pinned layers.

21. (Previously Presented) The magnetic storage system according to Claim 20, wherein a thickness of the first pinned layer is substantially equal to a thickness of the second pinned layer.

22. (Previously Presented) The magnetic storage system according to Claim 21, further comprising an anti-ferromagnetic (AFM) layer disposed adjacent to the first pinned layer.

23. (Previously Presented) The magnetic storage system according to Claim 22, wherein a thickness of the AFM layer establishes exchange coupling between the AFM layer and the first pinned layer.

24. (Previously Presented) The magnetic storage system according to Claim 22, wherein the first and second pinned layers are self-pinned.